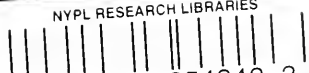


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GEORGE WARD BLODGETT







*Geo. W. Blodgett,*



# GEORGE WARD BLODGETT

BACHELOR OF SCIENCE IN CIVIL  
ENGINEERING: MASSACHUSETTS  
INSTITUTE OF TECHNOLOGY

## *A Memoir*

PREPARED FOR THE CLASS  
OF EIGHTEEN HUNDRED AND  
SEVENTY THREE

BY

HENRY AYLING PHILLIPS

BOSTON

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GEORGE WARD BLODGETT, son of Milo Bliss Blodgett and Zilpha Elizabeth (Bailey) Blodgett, was born August 23, 1849, at Guildhall, a village on the Connecticut River, in the northeastern part of Vermont, twenty odd miles north of the White Mountains. Four years later the family removed northward to Lemington in the same State, about ten miles from the Canadian boundary, where the father died when his son George was five years old, and there the widow in difficult circumstances bravely brought up her family of four little boys. If we may read her character in the lives of her sons during the following half-century, she was a woman of great industry, of worthy ambitions, and of earnest religious feeling. Her second child, George, supplemented the village schooling by a year at Colebrook Academy, in the town of that name on the opposite side of the river. That was in 1862 when he was thirteen years old,

## STUDENT

and fifty years afterwards his teacher, J. H. Dudley, Esq., of Colebrook, recalled George and his older brother (Dr. Albert N. Blodgett, of Boston) as ambitious, eager to acquire knowledge, and possessing peculiarly retentive memories that seemed never to forget anything; boys with no favoring circumstances of fortune, to whom success could come only through their own unaided energies. There is a story that the subject of this memoir began the study of law, but that he found its practice would not be consistent with his ideals of an honest man. He had what has been called the New England conscience well developed, and his conduct through life was governed by its dictates.

When Blodgett entered the Institute of Technology in 1869, he was twenty years of age and therefore older than most of his classmates. They recall the devotion to work which he displayed. Literally, he labored daily to the limits of exhaustion. With meagre financial resources he worked his way through college, as so many New England boys have done before and after him. His Colebrook friend, the late Ethan Colby, Esq., who loaned him money for this purpose, was faithfully re-



## MOST LABORIOUS

paid. One of the most persistent memories of those days is the picture of Blodgett's tall form at the top of a ladder, frequently manipulating the clock which looked down from the front of a lofty gallery into the stair hall of the Rogers Building, in attempts to make it tell correct time. His patience must have been tried. This task may have influenced the direction of his work in after years.

The establishment of the Institute, then but recent, inaugurated various advances in education. Its founders were wise men, but one thing they apparently ignored, namely, that students were human. Blodgett, a young man of ambition, conscientious and energetic, should have been warned that excessive scholastic application was not the wise and scientific ideal for an education. Lacking such counsel, he was a sufferer for want of it, and labored beyond the wise limit. When we compare the programme for the new Technology of to-day with that of its early years, when it was the exponent of a New Education, in no other direction is there so great and excellent a departure as in its purpose to furnish the youths who confide the direction of their education to the school, opportunities

## THE CLASS ASSOCIATION

not only for study, but also for the physical culture on the athletic field and in the gymnasium, and healthful relaxation through fraternities and various forms of social activity.

The records of the Class Association during forty years disclose what helpful part Blodgett rendered in all efforts for the benefit of the Class and of the Institute. At the first Class election, March 13, 1871, he was chosen Vice-President, as he was also for the following term of office, and for the years from 1883 to 1911 inclusive. He held the office in all for twenty-nine years. Besides this he was a member of the Executive Committee in 1878 and 1879.

He was one of those delegated in the fall of 1871 to confer with President Runkle concerning the hours during which the rooms where the students prepared their drawings should be kept open for work, and was as well on the committee for promoting good order in those rooms. During the next spring he was a committeeman to arrange for the second annual Class Supper which was held at the Parker House, and one of those who prepared a report of that gathering, where he took part in a quartette which sang, "Speed Away."

## MUSIC, WINE, AND THESES

He was fond of music and long enjoyed membership in the Handel and Haydn Society. When the Class held many and prolonged discussions whether wine should appear at the dinners he was always vigorously and consistently opposed to its use. February 23, 1873, he was chairman of the committee to present to Dr. Runkle the Class petition asking that the degrees might be conferred before the Class dispersed for the last time. The document arraigned the disadvantages of the existing arrangements by which the graduating theses could only be written after the students had left the Institute, and rehearsed the gains that would accrue if they were prepared earlier. The request met with no favor at the time, but these juvenile efforts were later justified when the desired methods were adopted by the school government, but too late to benefit these petitioners.

At the annual Class Meeting, January 23, 1874, Blodgett offered a motion, which was carried, namely, that "a Committee of three  
"be appointed to consult with the Classes and  
"Students who have graduated from the In-  
"stitute, to see what action they will take, if  
"any, in the formation of an Alumni Asso-

## THE ALUMNI ASSOCIATION

“ ciation, and report at the next annual meeting of the Class Association.” Blodgett was named first on this committee, the other members being William A. Kimball and Webster Wells. William Augustus Kimball, who had entered Yale in 1860, enlisted in a Connecticut regiment at the opening of the Civil War and later served in the Second New York Cavalry as lieutenant and captain, had joined this Class in the fall of 1870, and his suggestion for the formation of an Alumni Association was received with enthusiasm. The Class of Seventy-three may feel an honorable pride in having initiated an agency that has proved so prolific of benefit to our Alma Mater, and George Ward Blodgett may be remembered as the one who made the first formal movement for such accomplishment. He responded to the toast, “ *The Future of the Class*,” at the January meeting in 1875.

The first death in the Class was that of Samuel Augustus Fabers at the age of twenty-two years, and Blodgett presided over the special meeting called March 16, 1875, to take action thereon. He offered suitable resolutions of sorrow and regret.

## HIS STRONG MEMORY

January 28, 1876, he presented as its Secretary the report of the Committee on an Alumni Association, and at the same meeting he introduced a proposal for a Class Meeting at the National Centennial in Philadelphia.

At the Class Dinner on January 26, 1883, Blodgett read a eulogy upon the founder of the Institute of Technology, whose death had occurred the summer previous, and he was one of those selected to prepare appropriate resolutions to inscribe upon the records. He had been present at the dramatic scene when the venerable man, while addressing the Class of 1882 at its commencement exercises in Huntington Hall, suddenly fell dead upon the platform. Blodgett's powerful memory, perhaps assisted by some skill in shorthand, enabled him the next day to write out almost *verbatim* the whole of William Barton Rogers's last words addressed to the school he so much loved, which were the last words he uttered.

The report of the meeting of the following year states that Blodgett spoke with a great feeling of sympathy on the deaths of his classmates, Craig, Jewett, and Field. He was then made chairman of a committee to prepare biog-

## THE RHYMED SKIT

raphies of deceased members of the Class. During the following twenty-one years he was present at no less than eighteen annual meetings of this Association. Perhaps his last work for the Class was the rhymed skit he sent for the amusement of the Class Dinner in January, 1908. Several of the Class had long lived so far away as to make impossible their attendance at the annual dinners which had been regularly maintained during the thirty-five years elapsed since the Class separated at graduation. For their benefit the three sheets containing the verses were sent on their travels, and had safely and in immaculate shape traversed the Atlantic and the Pacific, had visited Mexico, Canada, California, and sundry nearer places, when in some unexplained way, at almost their last address, the papers were exposed to the weather and the sheet bearing the autographs of Dyer, Mansfield, Whittier, Johnston, and Hayes, was lost.

Blodgett's summer vacation in 1872 was spent with his classmate, Dr. Howes, on the United States Coast Survey boats (the *Hassler* and others), observing tides and currents in New York Harbor.

## EARLY EMPLOYMENT

The Water Department of the City of Boston organized in June, 1873, an engineering force for the construction of the Sudbury aqueduct to enlarge the city supply by water taken from the river of that name. Mr. Frederick P. Stearns, now the eminent hydraulic engineer, had charge of the party stationed at South Framingham, and this party Blodgett joined at that time as *leveller*. In September he was transferred to the party directed by Mr. Francis C. Tucker at Natick, with whom he continued until April, 1877, in which season the aqueduct was completed. For two years, 1875 and 1876, he had charge of the cement-testing laboratory. From July 23, 1877, until January 15, 1879, he was engaged as assistant to the Engineer of Locks and Canals at Lowell.

He then entered into business with his younger brother Aaron Daniel Blodgett (S.B., M.I.T., 1876), with whom he had formed a partnership the preceding year for the manufacture and installation of electrical fittings and apparatus, with an office and shop on Kilby Street in Boston. This partnership continued until 1894. It had been running two years when the elder brother entered the serv-

## SIGNAL ENGINEER

ice of the Boston and Albany Railroad Company as assistant engineer in charge of its electric signals. Such duties afforded a somewhat unique opportunity for the application of science to a new development of the highest practical importance. The large and profitable traffic between Boston and Albany made that railroad company one of the first to undertake a system of block signals, and therefore here more than on any other American railroad was worked out the development of the system peculiar to this country. Blodgett made good use of the circumstances.

European railroads had organized very thorough systems of signalmen to safeguard the movement of trains, and the business on many American lines had so grown that the need was keenly felt for a similar protection, but the English arrangement required so large a staff of men that the expense was prohibitive in this country. About five years before Blodgett entered the employment of the railroad company, it had begun to install the Hall system of train signals, which sought to substitute for an elaborate and costly corps of signalmen automatic appliances and electric currents. This was at that time in



## PROBLEMS SOLVED

an experimental stage, although already of great value, and Blodgett's task was to anticipate and make good the countless faults that only practical experience, extended over months, could reveal under stress of trying weather, the violence of heavy and high-speed trains, the chances of accident to the apparatus and of failure in its parts. During the year 1882 a system of track circuits was first introduced by which a current passing through the track rails was made to detect any obstruction to the safe passage of trains, whether a broken rail, an open switch, a car standing on the track, or a bar of metal lying across the rails, and having detected the peril, then instantly to report it to signals which warned the engineman day or night of danger ahead. This system opened a multitude of new problems to be patiently worked out before delicate apparatus, evasive currents, and complications of track and switch conditions should be so harnessed as always and everywhere to tell a true tale with infallible certainty. Incidentally the signal engineer had in the earlier stages to invent an administrative scheme and always afterwards to keep it working, by which he and his assistants could

## SIGNALS INSTALLED

receive very prompt and reliable information from wherever any failure of any of the multitudinous parts of the signals occurred, that the fault might be instantly repaired and measures taken promptly to prevent a repetition of the trouble. The Boston and Albany Railroad Company before 1880 had equipped its main line between Boston and Riverside and also the Brookline branch with Hall automatic signals, which were subsequently removed and replaced by the rail circuit system of the Union Switch and Signal Company. In 1902, three hundred and forty-five miles of track had been so equipped under Blodgett's direction, including the requisite home and distance signals.

The *Railroad Gazette* of June 24, 1887 (p. 413), contains an elaborate article by Blodgett describing very thoroughly the automatic signals on the Boston and Albany Railroad illustrated by plans and diagrams, both of the general dispositions and of the working of the complicated parts. He gave a similar description of automatic signals on the Fitchburg Railroad, in the number for June 15, 1888 (p. 379). Both these were included in a book of reprints from the *Gazette* en-

## THE SIGNAL CLOCK

titled *American Practice in Block Signals*. He explained in the same periodical of July 27, 1888 (p. 488), an electrical signal clock, the invention of himself and his brother, used at several railroad stations in Boston and elsewhere, by which a signal bell is rung automatically for the starting of each train; in the case of one station, dispatching more than sixty trains daily. The machine being wound, required no further attention except when a revision of the time-table changed the times for departures. The *Journal of the Franklin Institute* (Philadelphia) for March, 1883, contains an account of the electric clock by the Blodgett brothers. The paper had been read at a meeting of that Society and awarded a medal and grant of gold from the Scott Legacy Fund. August 5, 1892, again in the *Gazette* he discussed the means for preventing confusion between semaphore signals, so that the identity of each signal should always be clearly seen by the engineman. His long article describing block signals on the Boston and Albany Railroad and the history of the various improvements and simplifications during the twenty-five years they had been in use appeared in the *Gazette* of July 22, 1898

## THE RAILROAD GAZETTE

(p. 536). In the number for January 6, 1899 (p. 1), he writes further of "Rail Circuit Signals," while the issue for March 17 (p. 185) contains his paper entitled "Comments on Signalling" prepared for the meeting of the Railway Signalling Club held in Philadelphia, and that for July 28 (p. 536) has an article by him on the "Telephone in Railroad Service." During 1900 the *Gazette* printed two articles from his pen, one describing an accident to a car caused by the storage battery used for its illumination, and the other explaining where automatic crossing signal bells could be wisely used and some of the disadvantages resulting to the company which went to the expense of giving such protection to the public. He made many translations from French and German technical publications for the readers of the *Gazette*, but these and considerable editorial writing unsigned cannot be identified. In appreciation of this work extending over twenty-five years he was rewarded with a life subscription for the *Gazette*.

Blodgett's experience made him the first to speak authoritatively on his special subject, and he was appointed, in 1884, by the Institute of Technology, "Lecturer on the Appli-

## LECTURES

cation of Electricity to Railway Working." These courses of lectures delivered to the students in civil and electrical engineering, he continued for twenty years. The last five years his title was given as "Lecturer on the Application of Electricity to Railway Signaling." These lectures were printed in 1893, making a book of 118 pages of text and 33 pages of illustrations. He also lectured on the same subjects at Cornell and elsewhere, and in 1903 and 1904 lectured before the Engineering Society of Columbia College on "Telephone Line Construction."

Naturally, when the lighting of trains by electricity came up first in 1887, the electrician of the company was called upon to design and put in place such equipment. *The Transactions of the American Institute of Electrical Engineers*, vol. iv, contains Blodgett's résumé of what had been done abroad in lighting trains in different ways by electricity, and an account of such experiments in this country and especially of the equipment of the train which after a series of experimental trips began running regularly between Boston and New York in March, 1887, having the current for illumination furnished by storage

## ELECTRIC LIGHTING OF TRAINS

batteries which were charged at the end of the trip. This was probably the first train in the United States lighted by electricity where the installation was scientific, permanent, and workmanlike. Blodgett was elected a member of the American Society of Electrical Engineers in September, 1887.

Blodgett must have enjoyed one of the pleasantest experiences of his life in his long connection with the Society of Arts. It will be recalled that the Massachusetts Institute of Technology was originally planned to consist of three parts. These were a learned society, a school of science, and a museum. The Technical Museum has never taken form, although German cities have shown of what interest and value to the community such museums can be made. The establishment of the School had to wait for the conclusion of the Civil War, and in consequence of this, the Society of Arts of the Institute for some years at the beginning constituted the corporation. Although the Society has long yielded first place in public interest to the School, the former has continued always its useful and dignified course. Blodgett became a member of the Society of Arts in

## SOCIETY OF ARTS

1882, was elected a member of its Executive Committee in 1885, and from 1886 to 1905 inclusive was chairman of that Committee, and thus the executive head of the Society and officially the one to preside at its meetings when the President of the Massachusetts Institute of Technology was absent, during the régimes of Doctors Walker, Craft, and Pritchett. Blodgett presided for the last time at the meeting on March 13, 1902. *The Proceedings* of the Society contain papers delivered by him at its meetings November 23, 1882, January 22, 1885, and May 14, 1891.

Blodgett was elected a member of the Boston Society of Civil Engineers June 8, 1874. At its meeting of February 18, 1880, he read before that Society a paper on the "Production and Transmission of Power by Electricity," which was a review of the state of the art at that time when it was evident that power in large quantity was to be manufactured at such places as Niagara Falls, but when the problem of its economical distribution over long distances had been considered but not as yet solved. The paper was printed in *The Proceedings* of the Society (1880,

## BOSTON CIVIL ENGINEERS

p. 27). Ten years later, before the same Society, February 19, 1890, and on the same subject, he opened the discussion following a paper by Captain Eugene Griffin, and rehearsed in detail how great had been the increase in efficiency and economical results during the intervening decade. (*Journal of Engineering Societies*, vol. ix, p. 444.)

At the meeting of February 16, 1881, he read a paper on "Railroad Signals," this being a history of such signalling in Europe, wherein he endeavored to sketch briefly the most recent and valuable appliances for rendering railroad train movements more safe (*Proceedings*, vol. 1, p. 104). In the *Journal of Engineering Societies* (vol. 11, p. 241) is printed an article on "Time Signals," covering much the same ground as the one prepared for the Franklin Institute. His paper, read April 17, 1886 (*Journal*, vol. v, p. 431), on the "Application of Electricity to Railroad Signalling," describes the wonderful results obtained by the use of electric currents in the apparatus of the Union Switch and Signal Company installed on the Boston and Albany Railroad, and discusses several questions that confronted the engineer. These were:—



## HIS MARRIAGE

*First*, Can we depend upon electricity to operate apparatus with certainty and regularity? *Second*, What special precautions are necessary to secure this result? *Third*, To what extent are we justified in using it? *Fourth*, Does electric apparatus have the tendency to diminish the care and watchfulness employees would use without such adjuncts? *Fifth*, Should it be as far as possible automatic? A very thorough and lucid explanation of the interlocking of railroad switches and signals, as they are controlled by electric currents and operated by pneumatic power, with numerous illustrations, is presented in his paper on "Recent Practice in Railroad Signalling" read September 16, 1896, and printed in the *Journal*, vol. xvii, p. 182. At the meeting of September 2, 1905, he read a paper on "Recent Development in the Old Colony Street Railway Company."

December 17, 1881, he married Miss Ellen Fessenden Beach, of Boston, daughter of the Reverend Thomas Parnell Beach and Sarah Stickney (Barker) Beach. They adopted two daughters, Mildred Eleanor and Esther Louise, of whom the former graduated from the Institute of Technology in

## HIS HOME

1907, and is now instructor in Geology at Mount Holyoke College. Their pleasant home on the summit of the steep hill above Riverside Station commanded a beautiful view of the Charles River as it comes down through the valley from the west, the long reach of the stream which on summer afternoons is so gay with canoes making holiday.

Blodgett's Masonic degrees he received in the Dalhousie Lodge, Newton, in 1887, and he was Chaplain of that Lodge for four years beginning in June, 1888.

The Boston and Albany Railroad was leased to the New York Central Company in 1900. With the new management came new ideas. Trains which had run with clock-like regularity for fifty years suddenly went wrong. Even the trains making the circuit of twenty miles through Newton and Brookline ran fifteen or twenty minutes late. The traditions of the two companies had been different. The oft-quoted dictum of the head of the New York Company, in terse language consigning the public to Hades, illuminates what was long the attitude of that corporation. On the contrary, the leased company had been built and was largely owned by those who used it, and

## CHANGES

its officers and men were trained to courteous and intelligent discharge of their duties, and formed a personnel of exceptional excellence. The old management had been notable for an appreciation of the aids to be obtained from science and even from art. A small matter illustrates how new winds blew. The Boston and Albany had equipped its passenger coaches with thermometers, thus putting to impartial and scientific arbitration the chronic difference of opinion between the trainmen dressed to face inclement weather and the passengers desiring the temperature habitual in home and office. The new management removed the instruments of science for which it had no use. This detail is typical of larger aspects. Blodgett had reason to think that he held a life tenure of the position he had so long dignified. No man was better fitted by training, experience, and character to do so with honorable efficiency. He had been almost twenty-three years in the service of the company when he left it in 1902. The Chief Engineer to whom the Electrical Engineer ranked as assistant, wrote of Blodgett: "He "had charge of the electric signals and all "matters dependent upon or connected with

## RAILROAD SERVICE

“electricity. By his untiring zeal and devotion  
“to his work he performed valuable service  
“for the railroad company in a faithful and  
“conscientious manner.” The president of  
the corporation under whom he had served so  
long wrote expressing his regret that Blodgett  
had left his old position. William H. Barnes,  
who had been all his life in the employ of  
the Albany Railroad, and who as Assistant  
Superintendent, General Superintendent, and  
General Manager, for a score of years had  
officially observed Blodgett’s work, wrote that  
it had always been well and economically  
done and to the entire satisfaction of his supe-  
riors.

Blodgett, after so many years in one posi-  
tion, and then fifty-three years of age, was  
old for new ventures. In the spring of 1903  
he undertook the location of a high tension  
line for the Old Colony Street Railway Com-  
pany, from Quincy to Fall River. He had  
this location and right of way successfully  
completed in May, 1905. For four years he  
was employed by the Government as civil  
engineer at the Brooklyn Navy Yard (1906–  
10). In the summer of 1910 he removed to  
a farm near Lakewood, New Jersey, as the

## HIS DEATH

climate there was considered better for his wife, who had long been an invalid.

In the fall of 1911 he had occasion to go to a hospital for a simple operation. This was at Monmouth Memorial Hospital at Long Branch, New Jersey. Recovery was rapid and he planned to leave for home on the following day when death by apoplexy came in the night of November 22, 1911. His remains were brought to rest in the Newton Cemetery.

George Ward Blodgett was a religious man. When he resigned the charge of the Bible Class at Mount Vernon Church in Boston, his pastor, Dr. Albert Parker Fitch, now president of the Andover Theological Seminary at Cambridge, wrote to thank him "most sincerely and from my heart for your "quiet and steadfast loyalty to Christ, and the "spirit of service which you brought among "us. So few come into the church with any "intention of giving as well as getting and "fewer yet ever volunteer their services. But "you have done both and it has been an encouragement and comfort to many of us." At his death he was trustee of the Holmanville Presbyterian Church near his home.

## HIS CLASS OF BOYS

During his years in Brooklyn, New York, he was a teacher in the young men's class of the Park Congregational Sunday School, and one afternoon soon after his death a memorial service was held by his friends, as its minutes read, — “in commemoration of a life  
“of which we know only good, and because  
“his work in this school was one link in the  
“chain of his life, it is fitting and we are  
“honored to render this our tribute of re-  
“spect to his life. . . . He worked quietly  
“and unostentatiously, doing with a will, that  
“work which, in the service of his Master,  
“he saw to do. One of the pleasantest phases  
“of the work was the occasional social even-  
“ing he held in his home for the boys of his  
“class. Here better than elsewhere, one saw  
“the quiet force of the man and the genuine  
“and deep interest he had in the welfare of  
“those who came within his influence. . . .  
“When serious sickness visited his family  
“about three years ago and his painstaking  
“devotion to it left him with very little rest  
“for several successive weeks, he sacrificed  
“the time to come here and teach his class,  
“rather than leave the class without a teacher  
“and instead of taking rest he needed so

## A GODLY MAN

“much. Any person who knew Mr. Blodgett well, could not help realizing that he was a Godly man. . . . The first impression was his tender kindness and upon that would follow the uplifting influence his sincere and devotional life imparted.”

George Ward Blodgett was one of those for whom of old it was written : — “ Well done, thou good and faithful servant : enter thou into the joy of thy lord.”

## LINES TO HIS BOYS

*In the realm of heart and conscience,  
Where the spirit life abides,  
Better worth your while to suffer  
Loss of everything besides  
Than be recreant to or falter  
In the duty God has given  
Each, to make the world he lives in  
Just a little more like heaven.*

*Let me counsel every fellow  
Who is in the class to-day,  
Not to put off Christian living  
Till some future far away;  
Gladly seize the present moment,  
Ne'er will come a better time;  
If you'd reach the golden summit,  
Don't stand gazing up, but climb!  
With a heart both brave and tender,  
Full of faith and hope and love,  
Each day's work will bring us nearer  
To the better life above.*

FROM VERSES PREPARED OCTOBER 10, 1909, AND PRINTED  
AFTER HIS DEATH.



## DR. ROGERS'S LAST WORDS

MEN of the Massachusetts Institute of Technology will ever value the last words of its Founder, which have been preserved for us by Blodgett's care, and with peculiar propriety can they be here reprinted. The time was exactly noon on the second day of May, 1882, and the place, the platform of Huntington Hall where the Class of 1882 was assembled for its commencement exercises. Dr. Runkle described the scene when President Walker, with words of eloquent and glowing tribute, by which Mr. Rogers was visibly moved, invited him to speak. "His voice was at first weak and faltering, "but as was his wont, he gathered inspiration "from his theme, and for the moment his "voice rang out in its full volume and in "those well-remembered, and most thrilling "tones."

His words as Blodgett recorded them were as follows :—

The manner in which I have been received, and the words you have uttered, would, even if I were in the vigor of early manhood, affect me so deeply

## DR. ROGERS'S

as to make reply difficult. I confess to being an enthusiast on the subject of the Institute, but I am not ashamed of this enthusiasm, when I see what it has come to be. It is true we commenced in a small way, with a few earnest students, in some rooms fitted up in Summer Street, while, as your president has said, the tides rose and fell twice daily where we now are.

Our early labors with the Legislature in behalf of the Institute were sometimes met not only with repulse but with ridicule, yet we were encouraged and sustained by the great interest manifested by many in the enterprise. Formerly a wide separation existed between theory and practice ; now in every fabric that is made, in every structure that is reared, they are clearly united into one interlocking system, the practical is based upon the scientific, and the scientific is solidly built upon the practical.

You have not been treated here to-day to anything in the nature of oratorical display ; no decorations, no flowers, no music ; but you have seen in what careful and painstaking manner these young men and women have been prepared for their future occupation in life. And although the extracts from the theses which have been presented have been unavoidably largely stated in technical terms of science, yet they have shown a marvellous

## ADDRESS

thoroughness and accuracy, and in some instances are valuable contributions to our knowledge of the subjects of which they treat. What you have seen has been no research under the direction of a tutor and by his assistance, or prepared for display on this occasion, but it has been the ordinary work of the students, built upon the principles they have acquired in the earlier years of their scientific course, and they show how thoroughly they are equipped for the practical industries, either in the laboratory or in the field.

As I stand here to-day and see what the Institute is, what it has already accomplished, what it is at present doing, I call to mind the beginnings of science. I remember that one hundred and fifty years ago Stephen Hales published a pamphlet on the subject of illuminating gas, in which he stated that his researches had demonstrated that 128 grammes of bituminous coal . . .

“Here he bent forward as if consulting  
“some notes on the table before him . . .  
“then of a sudden there was silence in the  
“midst of speech, that stately figure suddenly  
“drooped, the fire died out of that eye ever  
“so quick to kindle at noble thoughts, and  
“before one of his attentive listeners had  
“time to suspect the cause, he fell to the

## DR. ROGERS'S DEATH

“platform — instantly dead. All his life  
“he had borne himself most faithfully and  
“heroically, and he died as so good a knight  
“would surely have wished, in harness, at  
“his post, and in the very part and act of  
“public duty.”

FROM A MEMOIR OF WILLIAM BARTON ROGERS, BY  
FRANCIS A. WALKER, READ BEFORE THE NATIONAL ACADEMY OF SCIENCE, 1887.







**This book is under no circumstances to be  
taken from the Building**

[illegible]



RBC

